

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

AMENDMENTS TO THE CLAIMS

Please substitute the following claims for the pending claims with the same numbers respectively:

Claim 1 (Currently amended): A portable audio device having
a signal processing device for performing digital audio decoding
comprising:

a distribution section which divides a first digital signal
framed for each predetermined time interval to $(N \times t + i)$ th
frame signals (i and t are integers, N is a natural number
greater than 1, and $0 \leq i < N$) and distributes said frame signals
for each frame interval one after another;

first to N th sub signal processing sections each of which is given ~~$(N \times t + i)$ th~~ said frame signals (i and t are integers, N
is a natural number, and $0 \leq i < N$) of a first digital signal
framed for each predetermined time interval from said
distributing section, and each of which completes a first process
within a period $(N \times T)$ (T is a real number);

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

a selection section which selects one of a processed signal outputted from said first to Nth sub signal processing sections for each frame interval one after another; and

a main signal processing section which converts a signal processed in a (i + 1)th sub signal processing inputted from said selection section into a second digital signal by completing a second process within a period T;

wherein said first digital signal is a compressed and encoded signal of an audio signal;

said second digital signal is a PCM signal of an audio signal;

said first process contains a process picking out information from the compressed and encoded signal to convert the information into information of a frequency spectrum; and

wherein the said second process contains a process employing converting said information generated in a past frame time; and

the first process excludes the information generated in the past frame time of said frequency spectrum into said PCM signal having a time basis.

Claim 2 (Cancelled) :

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

Claim 3 (Currently amended): The A portable audio device having a signal processing device according to claim 1, wherein said signal processing device further for performing digital audio decoding comprising:

first to Nth sub signal processing sections each of which is given $(N \times t + i)$ th frame signals (i and t are integers, N is a natural number greater than 1, and $0 \leq i < N$) of a first digital signal framed for each predetermined time interval and each of which completes a first process within a period $(N \times T)$ (T is a real number);

a first memory storing which stores said frame signal of said first digital signal one after another;

a main signal processing section which converts a signal processed in said $(i + 1)$ th sub signal processing section into a second digital signal by completing a second process within a period T;

a second memory storing which stores said frame signal of said second digital signal one after another; and

a distribution and selection section which sends the $(N \times t + i)$ th frame signal (i and t are integers, and $0 \leq i < N$) obtained from said main signal processing section to said $(i +$

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

1)th sub signal processing section, receives the signal on which said first process has been performed for the $(N \times (t - 1) + i)$ th frame signal from the $(i + 1)$ th sub signal processing section, and outputs said signal to said main signal processing section; and

wherein said first to Nth sub signal processing sections are connected to said distribution and selection section, performs the first process for said frame signal received from said distribution and selection section, and sends the after-process signal to said distribution and selection section; and

wherein said main signal processing section is connected to said first and second memories, picks out said frame signal from said first memory for each time interval T one after another to output said frame signal to said distribution and selection section, and performs said second process for said signal received from said distribution and selection section to store this after-process signal in said second memory;

said first digital signal is a compressed and encoded signal of an audio signal;

said second digital signal is a PCM signal of an audio signal;

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

said first process contains a process picking out
information from the compressed and encoded signal to convert the
information into information of a frequency spectrum; and
said second process contains a process converting said
information of said frequency spectrum into said PCM signal
having a time basis.

Claims 4-5 (Canceled) :

Claim 6 (Currently amended) : The signal processing device according to claim [[5]] 1, wherein
said first process contains a decoding process of a variable length code; and
said second process contains an inverse MDCT process.

Claim 7 (Currently amended) : The signal processing device according to claim [[5]] 1, wherein
said first process contains an inverse quantizing process inversely quantizing said compressed and encoded signal, and
said second process contains a sub-band synthesis filter bank process.

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

Claim 8 (Previously presented): The signal processing device according to claim 1, wherein

a division is made for said first process and said second process so that the calculation period necessary for said first process is N times a calculation period necessary for said second process.

Claim 9 (Cancelled):

Claim 10 (Currently amended): A signal processing device for performing digital audio encoding comprising:

a main signal processing section which is given $(N \times t + i)$ th frame signals (i and t are integers, N is a natural number greater than 1, and $0 \leq i < N$) of a first digital signal framed for each predetermined time interval and which completes a first process within a period T (T is a real number);

a distribution section which divides said frame signal outputted from said main signal processing section into said first to N th frame signal for each frame interval one after another;

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

first to Nth sub signal processing sections each of which is given [[a]] the (i + 1)th processed frame signal after the first digital signal had been processed in said main signal processing from said distribution section and converts [[a]] said frame signal into a second digital signal by completing a second process within a period (N × T); and

a selection section which selects one of the after-process signals outputted from said first to Nth sub signal processing sections for each frame interval one after another;

wherein said first digital signal is a PCM signal of an audio signal;

said second digital signal is a compressed and encoded signal of an audio signal;

wherein said first process excludes information generated in a past frame time contains a process converting said PCM signal into information of a frequency spectrum; and

said second process using the information generated in the past frame time contains a process encoding and compressing said information of said frequency spectrum.

Claim 11 (Cancelled):

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

Claim 12 (Currently amended): The signal processing device according to claim 10, wherein said signal processing device further for performing digital audio encoding comprising:

a main signal processing section which is given ($N \times t + i$)th frame signals (i and t are integers, N is a natural number greater than 1, and $0 \leq i < N$) of a first digital signal framed for each predetermined time interval and which completes a first process within a period T (T is a real number);

a first memory storing stores said frame signal of said first digital signal one after another;

first to N th sub signal processing sections each of which is given the $(i + 1)$ th frame signal after the first digital signal has been processed in said main signal processing section and converts the frame signal into a second digital signal by completing a second process within a period $(N \times T)$:

a second memory storing stores said frame signal of said second digital signal one after another; and

a distribution and selection section which sends a signal performed said first process and obtained from said main signal processing section to said $(i + 1)$ th sub signal processing section, receives a signal which said second process has been

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

performed for the $(N \times (t - 1) + i)$ th frame signal from said $(i + 1)$ th sub signal processing section, and outputs said signal to said main signal processing section; and

wherein said main signal processing section is connected to said first and second memories, picks out a frame signal from said first memory for each time interval T one after another, performs said first process for said $(N \times t + i)$ th frame signal to output said frame signal to said distribution and selection section, and stores this after-process signal received from said distribution and selection section in said second memory; and

wherein said first to Nth sub signal processing sections which perform said second process for said frame signal received from said distribution and selection section, and sends the after-process signal to said distribution and selection section;

said first digital signal is a PCM signal of an audio signal;

said second digital signal is a compressed and encoded signal of an audio signal;

said first process contains a process converting said PCM signal into information of a frequency spectrum; and

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

said second process contains a process encoding and compressing said information of said frequency spectrum.

Claims 13-14 (Canceled) :

Claim 15 (Currently amended) : The signal processing device according to claim [[14]] 10, wherein

 said first process contains a MDCT process; and

 said second process contains a Huffman coding process.

Claim 16 (Currently amended) : The signal processing device according to claim [[14]] 10, wherein

 said first process contains a sub-band analysis filter bank process; and

 said second process contains a quantizing process.

Claim 17 (Previously Presented) : The signal processing device according to claim 10, wherein

 a division is made for said first process and said second process so that a calculation period necessary for said second process is N times a calculation period necessary for said first process.

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

Claims 18-20 (Cancelled) :

Claim 21 (New) : A signal processing device comprising:
first to Nth sub signal processing sections each of which is
given $(N \times t + i)$ th frame signals (i and t are integers, N is a
natural number greater than 1, and $0 \leq i < N$) of a first digital
signal framed for each predetermined time interval and each of
which completes a first process within a period $(N \times T)$ (T is a
real number);

a main signal processing section which converts a signal
processed in a $(i + 1)$ th sub signal processing section into a
second digital signal by completing a second process within a
period T; and

wherein the first process and the second process are
completed for each i in a period $(N \times T + T)$.

Claim 22 (New) : A signal processing device comprising:
a main signal processing section which is given $(N \times t +$
 $i)$ th frame signals (i and t are integers, N is a natural number
greater than 1, and $0 \leq i < N$) of a first digital signal framed

Application No.: 09/741,912
Preliminary Amendment
Reply to Office Action dated January 13, 2005
July 13, 2005

for each predetermined time interval and which completes a first process within a period T (T is a real number);

first to N th sub signal processing sections each of which is given a $(i + 1)$ th frame signal after the first digital signal had been processed in said main signal processing section and converts a frame signal into a second digital signal by completing a second process within a period $(N \times T)$;

wherein the first process and the second process are completed for each i in a period $(N \times T + T)$.